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ABSTRACT

The increasing presence and use of computers in libraries has brought about the more frequent introduction of computers and their uses into library education. The Drexel University Graduate School of Library Science has introduced the computer into the curriculum more through individual experimentation and innovation than by planned development. In this way, it is adapted to specific areas rather than attached to remotely related courses. Training is in the areas of computer programming, data base access and on-line searching, and the use of packaged programs for data reduction and analysis. Access to several computers and data base services is a feature of the program. The format is detailed for those courses which employ computers. On-line training, with its problems and possibilities, is discussed. Statistical analysis is a facet of four courses. In the future, computer-aided instruction and the creation and manipulation of in-house data bases are areas which will be further investigated. (Author)

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THE COMPUTER IN LIBRARY EDUCATION:

ONE SCHOOL'S APPROACH

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THE COMPUTER IN LIBRARY EDUCATION:

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ABSTRACT

The increasing presence of computers and their uses in libraries has brought about the more frequent introduction of computers and uses of it into library education. The Drexel University GSLS has introduced the computer into the curriculum more through individual experimentation and innovation than by planned development. In this way, it is adapted to specific areas rather than attached to remotely related courses. Training is in the areas of computer programming, data base access and on-line searching, and the use of packaged programs for data reduction and analysis. Access to several computers and data base services is a feature of the program. The format is detailed for these courses which employ computers. On-line training, with its problems and possibilities, is discussed. Statistical analysis is a facet of four courses. In the future, computer-aided instruction and the creation and manipulation of in-house data bases are areas which will be further investigated. (127)

If the computer is not yet ubiquitous in present day libraries then at least the presence of computers is being felt in an ever increasing number of ways. This in turn increases the demand for librarians who are trained both in the direct use of computers and in the use of computer generated products and services.

This trend towards computerization has been felt in library schools as well. It is the purpose of this article to describe how computers and computing have been integrated into the curriculum of one school, the Drexel University Graduate School of Library Science.

The introduction of the computer into our curriculum has been a process characterized more by individual experimentation and innovation than by planned growth and development. The advantage of such an approach is that it is flexible and adaptive in meeting educational needs. The major disadvantage is a lack of coordination--students in similar areas of study may have widely different exposure to computers depending on their choice of courses. As a result, in a single class one may find students with several hours of on-line searching experience together with students who have never even seen an on-line demonstration. For the present this situation is controlled by providing tutorials outside of class to bring students to appropriate levels of knowledge. We believe that as we learn more about teaching computer related techniques, we will be able to improve their integration into the curriculum.

At present our curriculum offers three main types of training in computer usage. These are: direct control and use of machines through computer programming; data base access and on-line searching; and the use of

packaged programs for data reduction and analysis. Of these only computer programming is the topic of entire courses. The other types of training are dispersed among a variety of courses. In addition, we offer courses which deal with computer related topics such as management of automated operations, cost analysis, systems analysis, and the design of information systems.

Our present approach is to integrate computer training into all courses where it is appropriate. An alternate approach would be to offer computer work as separate specialized courses. An important benefit of our integrated approach is that it shows computer usage as an integral part of librarianship rather than as the province of a small group of specialists. This approach, however, raises a point of essential dichotomy. As long as the computer is simply one tool among many there is an implication that a greater depth of knowledge of one tool can offset more superficial knowledge of another. For example, students in a bibliography course may differ in their degree of knowledge of specific tools and yet each may be considered well skilled in the overall subject of bibliography. On the other hand, the power and the diversity available in a computer makes deep knowledge of the machine necessary for full exploitation. This means that at least some of our students need courses aimed at building this deep knowledge -- which in turn means introductory courses providing a strong preparation for this knowledge. The problem to be solved is the extent to which introductory courses specifically dealing with computers should be required and whether they should be required of all students or only those in specific areas of study. Since this involves predictions about the developing nature of library science, we do not expect easy solutions.

Computer Equipment

Our computer needs for program processing in interactive and batch modes are met by an IBM 370/168 and a DEC System 10. These computers are shared by a consortium of area universities and research organizations, thus making available much more computing power than a university of our size could normally afford. This computing power includes language capabilities in PL/1, BASIC, ALGOL, FORTRAN, COBOL, APL and others. We have a wide range of software packages (pre-written programs) for data manipulation and data base management. The library school has accounts with Systems Development Corporation and Lockheed Information Systems for the provision of on-line data base services. In addition we have access, as an educational member, to the Ohio College Library Center's data base of catalog information and to the BALLOTS data base at Stanford University.

We connect to these services through dial-up (telephone) connection and through on-site use in the case of our local computers. The library school has two terminals, one of which is a printing terminal and the other a CRT (television screen) terminal. In addition, the University has available a variety of terminals including a number of portable models which we use to accomodate multiple demonstrations or large classes. These terminals can also be borrowed for faculty or student use at home.

We have found that, as a library school, we are in a special position with respect to our computer usage needs. Our local computer facilities are oriented toward scientific and engineering problem solving which generally involves numeric data and large amounts of calculation on (relatively) small amounts of data. Our needs, on the other hand, tend to involve processing large quantities of textual data. These differences mean that computer center personnel are less able to advise and assist our students and consequently we must carry a greater burden within the school. It also means that the machine services and program packages available may not reflect our own priorities in data processing.

There is a similar mismatch with respect to training students in the use of on-line data bases. The data base services tend to assume a trained searcher with knowledge of the data base and a specific question to search. Our students are just learning search techniques and search tools. Thus, the on-line training manuals and user guides need to be supplemented for our situation. One particularly identifiable need is for more sample searches with commentary. This helps students without experience in actual reference work. We are in the process of developing our own training materials. In addition we have joined the Northeast Academic Science Information Center (NASIC), a group aimed primarily at introducing on-line searching to academic libraries. NASIC training materials are a useful supplement and several of our staff members have been trained at NASIC workshops.

Computer Programming

We teach two courses which are devoted to computer programming. The first, Computer Programming for Information Processing (L627), is designed as an introduction for students with no background in either mathematics or programming. The second course, Text Processing by Computer (L628) assumes programming background (or the first course) and concentrates on techniques for manipulating large amounts of textual data. This includes such things an automatic indexing, manipulating MARC tapes, and interactive processing. Both courses use the PL/1 programming language. The advanced course adds the use of the BASIC language.

The beginning course gives the students actual experience in writing and running programs. The exercises are aimed at such library related tasks as extracting key words, rotating titles, and formatting bibliographic data. In this course we want to prepare students to deal with computers and computer professionals but not necessarily to work as programmers. Thus the emphasis is on understanding and mastery of the more important aspects of the programming language rather than on covering the entire language. In line with this aim students are taught how programs should be written and documented for use by others. This includes structured programming, flow charting, and the writing of prose descriptions of the program's function.

About forty percent of our students take the beginning programming course. About five percent have sufficient background to begin with the advanced course. We have no present plans to expand our course offerings

in programming. Students who want more programming or specific experiences elect independent studies. Such studies have included learning the APL language, developing programs for computer-aided instruction, and working with complex file structures. Doctoral students seeking greater depth may take our seminar in systems design or, through a reciprocal agreement with the Moore School of Electrical Engineering of the University of Pennsylvania, courses such as compiler design or the construction of operating systems.

On-line Data Bases

The most pervasive and the newest impact of the computer on our curriculum has been that of on-line data bases. At least ten different courses presently make some use of on-line data bases. This ranges from simple demonstrations to intensive hands-on work. The courses involved range widely. The greatest use is in courses dealing with reference and bibliography in various subject areas.

The following are some brief descriptions of how on-line searching is used in various classes:

> In our introductory course, Fundamentals of Library and Information Science (L601-602), students see a number of specially selected searches performed. Closed circuit television is used to give everyone a view of the terminal. Each student performs a simple search involving two or three key words. Instruction concentrates on basic concepts and showing on-line searching as a part of all bibliographic resources.

Students in our Organization of Materials course (L610) prepare catalog cards for selected books. They try to identify search keys for each item. They test these keys on OCLC and compare their cataloging with that which is retrieved.

In Resources in the Social Sciences (L638) students prepare searches in advance -- verifying index terms in the printed indexes. Working in small groups, students model patrons and reference librarians in negotiating the questions as the on-line search is done.

Students in Abstracting and Indexing (L607) perform a series of assigned searches which allow them to compare index term searching against free text and to contrast indexing in different data bases. The students work in small groups and follow an outline for each search.

The emphasis in Resources in Science and Technology (L641) is on observing a number of diverse data bases. Students each select a data base and perform their own searches. They present a description of the data base and a review of their search to the rest of the class.

Any on-line experience must begin by familiarizing the student with the search commands and terminal operation. The techniques for presenting this material include lectures, readings, demonstrations, and actual

use. The technique or combination of techniques used depends upon both the instructional goals and the instructor's personal preference. We are especially concerned with the problem of redundancy in teaching search commands. A student who has been trained in one class probably does not need the same material in another. At present we tolerate a degree of redundancy but try to minimize it by offering introductory lectures on search commands outside of class time. In the future we expect to incorporate more of this introductory material into our course Fundamentals of Library and Information Science, which is required of all new students. We also hope that more self-instructional materials will become available. This would allow students to learn or review these concepts as they feel the need for it.

Our information systems laboratory is the focal point of on-line searching activity. The laboratory houses the terminals, phone lines, and a collection of manuals, thesauri, and educational materials. In addition, we have calculators and a special practice collection for indexing and retrieval. The laboratory is supervised by a graduate assistant who is specially trained in data-base searching. The assistant works closely with faculty in creating assignments and supervising student searches.

The most common setting for interactive use is small groups of three or four students performing a joint search. The group is generally supervised by the graduate assistant who provides guidance on proper command formulation and system capabilities along with suggestions on search strategy. The search might take from fifteen to thirty minutes. Student preparation for a search may range from almost none to actually performing the

equivalent manual search. In some situations students select search topics of personal interest while in others the topics and even the general search strategies are specified for them. This variety of instructional approaches allows instructors to emphasize different aspects of on-line data base use. The result is that an exercise aimed at students without prior experience can also provide a new point of view to students who have had on-line experience in another class.

Regardless of the assignment or the student's preparation, reacting to the on-line retrieval and reformulating a search as one goes on are intellectually demanding activities -- especially for the inexperienced. This means that a student who is still mastering the technical aspects of searching may not be able to fully experience the intellectual aspects. One of the major advantages of performing searches in groups is that those students who are not operating the terminal have more opportunity to reflect on the development of the strategy. In this area the role of the graduate assistant as a facilitator is very important. The graduate assistant can interpret the machine's responses and pose questions to aid the searchers.

The complexity of possible search strategies and the speed of the computer means that there is a good deal to be learned from retrospective consideration of a search. Sometimes this is left to the student -- either on his own or as a formal paper. Other times the critique is provided by the instructor. This is another advantage of the group approach since the students can follow the search with an immediate discussion of the technique.

We are still in the process of deciding how much and what kind of on-line training students should have. There are two aspects of this training. The first is familiarization with search language and search techniques independent of specific data bases. The second area is the specifics of data bases and vocabularies. We recognize that both kinds of skill are important, but that ultimately they must be learned in an environment which involves responding to users with real information needs. We see our role as preparing students to use on-the-job experiences as learning situations.

No discussion of on-line searching is complete without a consideration of the costs. We have been fortunate to have the support of the University administration in establishing a specific budget for on-line searching. In addition, the data base vendors have provided some time at reduced rates and some free demonstrations. The fact remains that the cost of giving an entire class hands-on experience is not insignificant. One of the problems is the charging method used by the data base vendors -- that is, a fixed hourly rate based on the total time connected rather than on actual demands placed on the system. An inexperienced student may spend much of his first search trying to master the terminal and to type the search commands correctly. Even after leaning the commands, a student tends to react more slowly in refining and modifying his search than would an experienced searcher. For these reasons the graduate assistant plays an important role in cost control by guiding and expediting the student's search.

The expenses for computer programming and data analysis are charged against a budget which is separate from that for on-line searching. It is difficult to compare the amounts of computer resources used, but in general the programming students have more computer use than do those doing on-line searching. In terms of dollars per student however, the amounts tend to be the same, averaging twenty to thirty dollars per student per course. Data analysis is considerably cheaper, averaging under ten dollars per student. The type of use made of the machine is different. In computer programming we are able to give students considerably more latitude in experimenting and learning from their own errors. On-line search costs preclude such a teaching approach.

Computers in Data Analysis

Our third major area of computer usage is the use of packaged programs for data analysis. In particular we use the data analysis programs in SPSS (Statistical Package for the Social Sciences).

This package is designed for use by people without computer or statistical background. The user need only name his variable, and specify the set of statistics to be calculated. In practice we find that students can quickly master these techniques and apply them. The result is that more attention can be given to considering the interpretation of statistical data rather than the manipulation of numbers.

Students are introduced to statistical analysis in our Fundamentals course. Lectures present simple statistical concepts and a laboratory exercise leads students through step-by-step calculations and interpretation

of the results. The introduction to computer data analysis comes in our class, Measuring Library Use (L690). Students learn about various statistics, see computer analyses of existing surveys, collect data of their own, and, finally, use the computer to analyze their own data. The statistics which the computer can calculate includes averages, standard deviations, and percentiles. In addition students can generate tables, histograms, and graphs (scatter plots).

Students who wish to pursue this area further can do so through courses in Research Methods (L691) or Information Systems Analysis (L688) or through supervised Independent Studies (L893). For some students this involves working with a library or information center to collect and analyze new data. Others pursue this area of interest by performing new analyses of existing data. To this end we have a collection of survey data, including some from national surveys. Students are able to single out areas of special interest and to perform in-depth analyses which go beyond the original uses made of the data.

Doctoral students are required to take a graduate course in statistics as a prerequisite to our Seminar in Research Methodology (L694). This seminar draws heavily on computer program packages and on sample analyses using data drawn from the research literature. Many of the techniques are too cumbersome for hand calculation and can only be implemented by using computers. The techniques include multiple regression, factor analysis, and clustering.

Plans for the Future

We are still in a development phase with respect to our use of computers. We expect that as we gather more experience and as the role of computers in libraries develops, our curriculum will continue to change. One development will be a reduction in redundancy in our introduction to on-line searching. We may also require a greater practical knowledge of computers and computer usage for all of our students. This might be done by including the materials in a required course or by setting a proficiency requirement supported by a non-credit course.

At present we have done little in the field of computer-aided instruction (CAI). We have experimented with some internally produced management games, but have not been able to create strong educational tools. Some of our advanced students have been working with a program which simulates simple library operations. Our goal here is not to truly represent the world but to teach the use of simulation and to gain insight into real world functions. Our slow progress in the area of CAI is a reflection of our own limitations and priorities. We intend, however, to continue investigations in this area.

Another area in which we are experimenting is the creation and manipulation of our own data bases. This would have advantages in training students on data bases, which are smaller and closer to their interests. We hope it will also prove a cheaper way of training students in data base commands. We presently have an on-line search capability for detailed descriptions of Library School courses. We hope to create a searchable file derived from MARC records. It remains to be seen whether this approach will be both cost-effective and pedagogically worth-while.

Acknowledgements

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